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the morphological, ecological, and physiological treatment of each topic is kept rather distinct. At times excellent work that is suggested in physiology is quite unrelated to the other work with which it appears, as when the physiology of turgidity and osmosis is interpolated under the caption of "the morphology of flowers," or the tropisms under "the morphology of fruits."

There is confessedly presented more work than can be done in a year. The teacher must adjust the course to his needs and facilities. The outline will doubtless prove most valuable in directing many teachers so that they can arrange the kind of course that best suits their needs. An appendix gives the unit statements for courses in secondary schools as they have been outlined by the special committees, one from the Botanical Society of America and the College Entrance Board, and the other from the North Central Association of Colleges and Secondary Schools. These are the two representative organizations that have attempted to outline these statements, and therefore their units should be of particular interest to botanists.

Teachers of botany and botanists in general are greatly indebted to Professor GANONG for this book, which should be influential in enhancing the educational efficiency of science and particularly of botanical science.—O. W. CALDWELL.

Tropical agriculture

Agriculture in the tropics is the title of a book² designed to treat chiefly of the commercial aspects of tropical plants, and is in no sense a guide to the practice of agriculture. The most valuable arable lands of the tropics are now under the control of white people, and the book obviously is intended to furnish them with data that "may be helpful and thought-stimulating for the student, administrator, or traveller." The great influence of "western" civilization and agriculture is credited with having brought a revolution in tropical agriculture.

Parts I and II ("The preliminaries to agriculture" and "The principal cultivations of the tropics") will be of interest to students of plant life, while these parts and parts III and IV ("Agriculture in the tropics" and "Agricultural organization and policy") will interest geographers and economists. Topics of special interest in part I are land and soil, climate, drainage and irrigation, and plant life in the tropics (acclimatization). In part II there are presented the leading tropical economic plants and plant products, their botanical nature, history, cultivation, productivity, use, marketability, commercial importance, adaptability to new regions, and dangers from plant and animal parasites. In part III much attention is given to the need of giving modern agricultural education to the peasants who farm the tropical estates.

The book contains an immense amount of statistical matter relative to the

² WILLIS, J. C., *Agriculture in the tropics; an elementary treatise.* pp. xviii + 222. figs. 25. Cambridge Biological Series. London: Cambridge University Press. \$2.50.

importance of agricultural plants and their future possibilities. It will be found a valuable reference book upon many questions pertaining to economic and commercial aspects of tropical plants. Botanically, however, the book is often defective, as for example, in speaking of the growth of *Cannabis sativa* for its opium-like drug, the author says: "The male flowers are removed in November, for if the female flowers are fertilized there is no formation of the drug."—O. W. CALDWELL.

The geography of ferns

It is a praiseworthy thing for an investigator, who has devoted years to taxonomic exploration, to bring together in readable form the many things of geographic interest which he has observed. It is exactly this service which CHRIST, the well-known student of the ferns, has now performed.³ The volume is divided into two parts, corresponding somewhat to the usual divisions of ecological and floristic geography. CHRIST regards the ferns as controlled by the same general distributional factors as the seed plants, the most noteworthy difference consisting in the pronounced tendency of ferns to be hygrophytic mesotherms. The great fern areas of the world are essentially coincident with the forest areas, very few species existing where the rainfall is less than 60 cm., and the greatest development occurring where the rainfall is over 200 cm.

The edaphic conditions under which ferns live are first noted, attention being called to the fact that most species are humus forms, and but slightly dependent on the mineral nature of the soil. Under the head of climatic conditions, a number of characteristic fern formations are described. The hygrophytic ferns are treated at considerable length, especial attention being devoted to the epiphytic forms. The features of the xerophytic ferns are well portrayed. In the floristic part of the work, consideration is given to a number of cosmopolites, and also to endemic forms and to species with disconnected areas. The body of the second part is made up of the treatment of the floristic regions of the world. Here, as elsewhere in the volume, the author makes it very clear that the ferns, in spite of their great age, are far from being a senescent group.

The volume is a mine of information, and will be of the highest value to all botanists. The excellent index makes it possible to find at once the known ecological and geographic facts concerning most living ferns.—HENRY C. COWLES.

An organic chemistry

The third English edition of HOLLEMAN'S *Organic chemistry* has just appeared,⁴ edited by A. JAMIESON WALKER. The value of the book as a text

³ CHRIST, H., *Die Geographie der Farne*. 8vo. pp. 358, with frontispiece, *figs.* 129 (mostly photographic reproductions), and 3 *maps*. Jena: Gustav Fischer. 1910.

⁴ HOLLEMAN, A. F., *A textbook of organic chemistry*. 8vo. pp. xx+599. *figs.* 80. New York: John Wiley & Sons. 1910.